

manuscripta mathematica

Volume 77 1992

Editors

M. Barner, Müllheim
H. Brézis, Paris
P. M. Cohn, London
A. Dold, Heidelberg

S. Hildebrandt, Bonn
T. Kato, Berkeley
H. Kraft, Basel

A. Prestel, Konstanz
P. Roquette, Heidelberg
A. J. Sommese, Notre Dame

Copyright. Submission of a manuscript implies: that the work described has not been published before (except in the form of an abstract or as part of a published lecture, review, or thesis); that it is not under consideration for publication elsewhere; that its publication has been approved by all coauthors, if any, as well as by the responsible authorities at the institute where the work has been carried out; that, if and when the manuscript is accepted for publication, the authors agree to automatic transfer of the copyright to the publisher; and that the manuscript will not be published elsewhere in any language without the consent of the copyright holders.

All articles published in this journal are protected by copyright, which covers the exclusive rights to reproduce and distribute the article (e. g., as offprints), as well as all translation rights. No material published in this journal may be reproduced photographically or stored on microfilm, in electronic data bases, video disks etc., without first obtaining written permission from the publisher. The use of general descriptive names, trade names, trademarks, etc., in this publication, even if not specifically identified, does not imply that these names are not protected by the relevant laws and regulations.

While the advice and information in this journal is believed to be true and accurate at the date of its going to press, neither the authors, the editors, nor the publisher can accept any legal responsibility for any errors or omissions that may be made. The publisher makes not warranty, express or implied, with respect to the material contained herein.

Special regulations for photocopies in the USA. Photocopies may be made for personal or in-house use beyond the limitations stipulated under Section 107 or 108 of U. S. Copyright Law, provided a fee is paid. All fees should be paid to the Copyright Clearance Center, Inc., 21 Congress Street, Salem, MA 01970, USA, stating the ISSN 0025-2611, the volume, and the first and last page numbers of each article copied. The copyright owner's consent does not include copying for general distribution, promotion, new works, or resale. In these cases, specific written permission must first be obtained from the publisher.

Printers: Brühlsche Universitätsdruckerei, Giessen

Printed in Germany – © Springer-Verlag Berlin Heidelberg 1992

Springer-Verlag GmbH & Co. KG, W-1000 Berlin 33, Federal Republic of Germany



Springer International

Contents

- Andreucci, D.: New results on the Cauchy problem for parabolic systems and equations with strongly non linear sources 127
- Baraket, S., Ye, D.: Minimizing harmonic mappings from a surface perforated with small holes into a Riemannian manifold 191
- Basarab, S. A., Kuhlmann, F.-V.: An isomorphism theorem for henselian algebraic extensions of valued fields 113
- Berestycki, H., Grossi, M., Pacella, F.: A nonexistence theorem for an equation with critical Sobolev exponent in the half space 265
- Bruns, W., Herzog, J.: On the computation of a -invariants 201
- Buchner, M., Kucharz, W.: Algebraic, rational, and homological equivalence of real cycles 105
- Burgeth, B.: A Schwarz Lemma for harmonic and hyperbolic-harmonic functions in higher dimensions 283
- Chanillo, S., Li, Y. Y.: Continuity of solutions of uniformly elliptic equations in \mathbb{R}^2 415
- Choe, J., Gulliver, R.: Isoperimetric inequalities on minimal submanifolds of space forms 169
- Coppens, M., Keem, C., Martens, G.: Primitive linear series on curves 237
- Fabritius, C. de: On continuous dynamics of automorphisms of \mathbb{C}^2 337
- Gastel, A.: Regularity of minimizing harmonic mappings into ellipsoids and similar other manifolds 97
- Grossi, M. → Berestycki, H.
- Große-Brauckmann, K.: Interior and boundary monotonicity formulas for stationary harmonic maps 89
- Gulliver, R. → Choe, J.
- Herzog, J. → Bruns, W.
- Hong, M.-C.: Liouville theorems for exponentially harmonic functions on Riemannian manifolds 41
- Hübl, R.: A note on the Hochschild homology and cyclic homology of a topological algebra 63
- Keem, C. → Coppens, M.
- Kim, H. H.: Eisenstein series on quaternion half-space of degree n 215
- Krüskenper, M.: The quadratic form transfer and valuations 47
- Kucharz, W. → Buchner, M.
- Kuhlmann, F.-V. → Basarab, S. A.
- Lashkarizadeh Bami, M.: The L^∞ -representation algebra of a foundation topological semigroup 161
- Li, Y. Y. → Chanillo, S.
- Louboutin, S.: Détermination des corps quartiques cycliques totalement imaginaires à groupe des classes d'idéaux d'exposant ≤ 2 385
- Martens, G. → Coppens, M.
- Matzat, B. H.: Kanonische Codes auf eigenen Überdeckungskurven 321
- Nagaoka, S.: A note on the Siegel-Eisenstein series of weight 2 on $Sp_2(\mathbb{Z})$ 71
- Pacella, F. → Berestycki, M.
- Qing, J.: Multiple solutions of the Dirichlet problem for harmonic maps from discs into 2-spheres 435
- Schulz, F.: Boundary regularity for certain quasilinear elliptic system of divergence structure 1
- Shimada, T.: Some remarks on Leopoldt's conjecture 405
- Spallek, K.: W-Gleitgleitkinematik 293
- Warlimont, R.: Arithmetical semigroups V: multiplicative functions 361
- Williams, F. L.: A factorization of the Selberg zeta function attached to a rank 1 space form 17
- Ye, D. → Baraket, S.
- Covered by *Zentralblatt für Mathematik* and *Current Mathematical Publications*

Instructions for authors

manuscripta
mathematica

Authors are requested to read the following instructions carefully before preparing their manuscript

1. Submission of manuscripts

Manuscripts may be submitted to any one of the Editors. They should not exceed 20 pages. Two copies should be submitted (one for the referee). Manuscripts are reproduced directly by a photographic process which excludes the possibility of alterations during the production process.

2. Offprints

Authors receive 50 free offprints per paper. An offprint order form for additional offprints will be sent to authors by the publisher. This form must be returned promptly to Springer-Verlag, Heidelberg, to ensure receipt of the additional offprints and to avoid additional expense after publication of the issue.

3. T_EX layout macro package

Authors are encouraged to use Springer-Verlag's Plain T_EX Layout Macro Package to prepare their camera-ready manuscripts. The macro package and instructions can be obtained on floppy disk or tape from

Springer-Verlag
Journal Production III
Postfach 10 52 80
W-6900 Heidelberg 1, FRG
Telex 4-61723, FAX (0) 6221-487625

Be sure to give the type and size of the required disk, e.g. MS-DOS or Macintosh and 5 1/4" or 3 1/2".

The macro package and much more is available through our fileserver; send an e-mail to svserv@dhdspri6.bitnet with the message body help to get more information.

4. Typing area and spacing

Authors who cannot use the plain T_EX macros should carefully observe the following instructions. Use opaque letter size paper with a typing area of 15 × 24.5 cm plus running head (will be reduced by 20%) or 12 × 19.5 cm plus running head (1:1 reproduction). Special typing paper on which the typing area is marked can be obtained from the publisher (address see above). If a manuscript is unsuitable for reproduction then it will be returned. Manuscripts should be typed in 1 1/2-line spacing or printed in 12 pt characters with 5 mm base-to-base interline space. Please type on one side of the paper only. The following portions should be in single-line spacing resp. 3 mm interline space: abstract, footnotes, tables, and references.

5. Print quality

The best reproduction is obtained from typing that is sharp and even. Use a high resolution laser printer (300 dpi) or an electric typewriter. If you use a typewriter then avoid smudges and erasures when making corrections. Use a white correcting fluid or white patches. The page may also be cut and glued but take care that the lines remain parallel and evenly spaced.

6. Manuscript structure

The manuscript is to be structured as follows:

- a. A space 5 cm deep should be left at the top of the *first page* for the publisher to insert the source data
- b. *Title* of paper with initial capitalization (flush left and not underlined)

- c. *Author's name*: first name(s), followed by surname without academic title and without the preposition "by"
- d. *Abstract* in English, approximately 10–12 lines long (without the word "Abstract")
- e. *Text*
- f. *References* (see below)
- g. *Author's full postal address* aligned on the left under the last reference in the bibliography
- h. At the bottom of the *last page* there should be a space of at least 2 cm above the lower limit of the typing area for the publisher to insert the date of receipt.

The running head will be simply the author's surname, typed in capitals. If there are two authors, both names are to be given (with a hyphen). If there are more than two authors, only the name of the first author is to be given, followed by "et al.". The names should be centered and typed 2 lines of text above the upper edge of the typing area. The manuscript page number should be typed on the same line at the outside edge of the page. The page numbers for the complete volume will be inserted later by the publisher at the bottom of the page.

Footnotes should be placed at the bottom of the page on which they are cited and should be separated from the text by a horizontal rule 2 cm long. They should be inside the typing area.

Figures may be drawn either directly on the manuscript page or on separate sheets; in the latter case an appropriate space must be left in the text for them. Good reproduction is achieved only when the figures are drawn cleanly and smoothly in black ink. Labelling may be typed directly on the figures. Please remember that the illustrations will be reproduced together with the text and therefore reduced by 20% or reproduced 1:1 depending on the typesize. Captions to figures should be placed below them.

References to the literature in the text should be by numbers enclosed in square brackets. The references should be listed in alphabetical order at the end of the paper, then num-

bered consecutively. They should be cited as follows:

Journal papers: Names and initials of all authors, full title, journal as abbreviated in *Zentralblatt für Mathematik*, first and last page numbers, year in brackets.

Example:

1. Karcher, H.: The triply periodic minimal surfaces of Alan Schoen and their constant mean curvature companions. *Manuscr. Math.* **64**, 291–357 (1989)

Books: Author's names and initials, title, edition, place, publisher and year.

Example:

2. Fröhlich, A.: Galois module structure of algebraic integers. (*Ergebnisse der Mathematik und ihrer Grenzgebiete*, 3. Folge, Bd 1) Berlin Heidelberg New York: Springer 1983

A choice of procedures is given below depending on whether sophisticated word processing equipment is used (1) or a regular typewriter (2):

Paragraphs will be indicated by the open-ended final line and wider line spacing, but the first line should be indented. The words "Theorem", "Lemma", "Corollary", "Proposition" etc. should be (1) in bold face or, (2) in capitals and underlined once, followed by the formulation in (1) italics or (2) underlined. The words "Proof", "Remark", "Example", "Note" etc., should be in (1) italics followed by the text in roman or (2) in roman, underlined, followed by the text in roman.

Example (1):

Proposition 6. *Let r be a natural number...*

Example (2):

PROPOSITION 6. Let r be a natural number
...

Headings and subheadings should be aligned with the left margin. Do not use § signs. Subdivisions of headings should be underlined, including spaces, as follows:

- a. (1) boldface or (2) underline twice
- b. (1) *italics* or (2) underline once
- c. (1) *italics* and run text on or (2) underline once and run text on

Calculus of Variations and Partial Differential Equations

Managing Editors: M. Giaquinta, Firenze; S. Hildebrandt, Bonn; L. Modica, Pisa

Editorial Board: J. Ball, J. P. Bourguignon, H. Brezis, L. Caffarelli, J. Jost, E. Lieb, F. H. Lin, P. L. Lions, H. Matano, J. Moser, P. Rabinowitz, R. Schoen, L. Simon, M. Struwe, F. Tomi, K. Uhlenbeck

Calculus of variations and partial differential equations are classical, very active, closely related areas of mathematics, with important ramifications in differential geometry and mathematical physics.

This journal will attract and collect many top-quality contributions to this field of research, and stress the interactions between analysts, geometers, and physicists. Moreover, it offers an opportunity for communication among scientists working in the field through a section "New and Views". The field of **Calculus of Variations and Partial Differential Equations** is extensive; nonetheless, the journal will be open to all interesting new developments. Topics to be covered include:

- Minimization problems for variational integrals, existence and regularity theory for minimizers and critical points, geometric measure theory;
- Variational methods for partial differential equations, linear and nonlinear eigenvalue problems, bifurcation theory;
- Variational problems in differential and complex geometry, such as geodesics, minimal surfaces, harmonic mappings, critical points of curvature integrals, Einstein equations, Yang-Mills fields;
- Variational methods in global analysis and topology: Morse theory, Ljusternik-Schnirelman theory, flows generated by variational integrals and parabolic equations, index theorems, integral invariants;
- Dynamical systems, symplectic geometry, periodic solutions of Hamiltonian systems;
- Variational methods in mathematical physics, nonlinear elasticity, crystals, asymptotic variational problems, homogenization, capillary phenomena, free boundary problems and phase transitions;
- Monge-Ampère equations and other fully nonlinear partial differential equations related to problems in differential geometry, complex geometry, and physics.

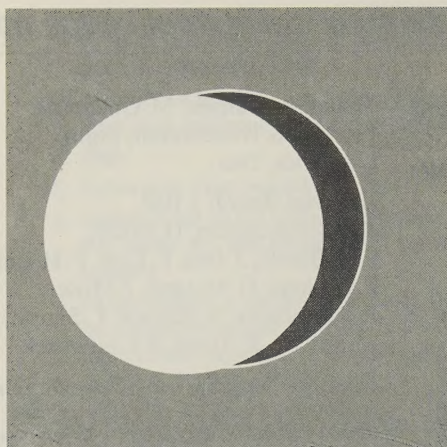
Springer-Verlag
Berlin
Heidelberg
New York
London
Paris
Tokyo
Hong Kong
Barcelona
Budapest

tm.108/MNTZ/E/1

Subscription information 1993:
ISSN pending Title No. 256

Vol. 1 (4 issues) DM 480,-
suggested list price, plus carriage
charges (FRG DM 7,14;
other countries DM 14,-)

- Heidelberger Platz 3, W-1000 Berlin 33, F.R. Germany □ 175 Fifth Ave., New York, NY 10010, USA
□ 8 Alexandra Rd., London SW19 7JZ, England □ 26, rue des Carmes, F-75005 Paris, France
□ 37-3, Hongo 3-chome, Bunkyo-ku, Tokyo 113, Japan
□ Room 701, Mirror Tower, 61 Mody Road, Tsimshatsui, Kowloon, Hong Kong
□ Avinguda Diagonal, 468-4°C, E-08006 Barcelona, Spain □ Wesselényi u. 28, H-1075 Budapest, Hungary



N. Berline, Ecole Polytechnique, Palaiseau;
E. Getzler, Massachusetts Institute of
 Technology, Cambridge, MA; **M. Vergne**,
 DMI Ecole Normale Supérieure, Paris

Heat Kernels and Dirac Operators

1992. VII, 369 pp. (A Series of
 Comprehensive Studies in Mathematics,
 Bd. 298) Hardcover DM 118,-
 ISBN 3-540-53340-0

The past few years have seen the emergence of new insights into the Atiyah-Singer Index Theorem for Dirac operators. In this book, elementary proofs of this theorem, and some of its more recent generalizations, due to the authors and J.-M. Bismut, are presented. The formula for the index of the Dirac operator is obtained from the classical formula for the heat kernel of the harmonic oscillator. The only prerequisites to reading this book are a familiarity with basic differential geometry. The book finishes with a treatment of the index bundle and Bismut's local version of the Atiyah-Singer Index Theorem for families. As an application, the curvature of the determinant line bundle is calculated, following Bismut and Freed.

L. Pastur, Academy of Sciences, of the
 Ukrainian SSR, Kharkov; **A. Figotin**,
 University of Nevada, Reno, NV

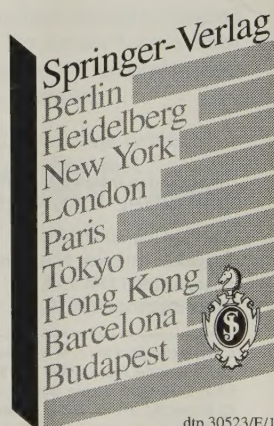
Spectra of Random and Almost-Periodic Operators

1992. VIII, 587 pp. (A Series of
 Comprehensive Studies in Mathematics,
 Bd. 297) Hardcover DM 178,-
 ISBN 3-540-50622-5

This study of the spectra and related characteristics of random and almost-periodic operators of various types (Schrödinger, continuous, discrete and more general) is a lively and fascinating field of research lying at the intersection of mathematical physics, spectral theory of operators and probability theory. A widespread interest in the domain and a vast amount of mathematical activity have led to many remarkable new results and viewpoints yielding insight even into traditional questions.

This book by two of the leading researchers in the field is the first systematic treatment of the fundamental problems and the large body of mathematical results known, and thus fills the gap in the reference literature. Not content to highlight the important ideas and recently developed concepts and methods, it also provides a large number of exercises to guide the reader towards improvements and generalizations.

□ Heidelberger Platz 3, W-1000 Berlin 33, F.R. Germany □ 175 Fifth Ave., New York, NY 10010, USA
 □ 8 Alexandra Rd., London SW 19 7JZ, England □ 26, rue des Carmes, F-75005 Paris, France
 □ 37-3, Hongo 3-chome, Bunkyo-ku, Tokyo 113, Japan □ Room 701, Mirror Tower, 61 Mody Road,
 Tsimshatsui, Kowloon, Hong Kong □ Avinguda Diagonal, 468-4° C, E-08006 Barcelona, Spain
 □ Wesselényi u. 28, H-1075 Budapest, Hungary



dtp.30523/E/1